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(21) International Application Number: PCT/NZ95/00098 (22) International Filing Date: 29 September 1995 (29.09.95) (30) Priority Data: 264669 12 October 1994 (12.10.94) NZ (71)(72) Applicant and Inventor: McINTYRE, Robert, Dymock [NZ/NZ]; McIntyre's Lane, RD 5, Hunterville (NZ). (72) Inventor; and (75) Inventor/Applicant (for US only): WHITFIELD, Robin [NZ/NZ]; Hendersons Line, Palmerston North (NZ). (74) Agents: HOPKINS, Donald, Leslie et al.; Unit 2, Northcote Office Park, 145 Queen Street, Palmerston North (NZ).		(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published <i>With international search report.</i>
(54) Title: IMPROVEMENTS IN TEATS		
(57) Abstract A teat for the feeding of young animals. The teat is formed by a hollow body (10) made of a resilient material. The body has an inlet end (11) and an outlet end (12). The outlet end includes one or more slits (20) through the wall (19) of the body. The slit or slits do not extend into that area (18) of the wall (19) of the body which forms the extremity (18) of the outlet end (12). The inlet end (11) has a bung (16) inserted therein, this bung incorporating a valve (26, 27).		

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IMPROVEMENTS IN TEATS

This invention relates to improvements in teats of the type used in the feeding of animals particularly the rearing of
5 young animals such as calves.

In my New Zealand Patent Specification 247058 there is described and claimed a teat for the feeding of young animals, this teat having proved in use to be extremely
10 effective as an animal suckling on the teat can over a given period of time obtain a greater volume of feed than with conventional teats. I have now developed an improvement to that teat to make it even easier and more effective for an animal to obtain maximum flow of feed with a minimum of
15 effort.

Broadly, the present invention provides a teat comprising a hollow body made of a resilient material, said body having an inlet end and an outlet end, said outlet end including one or
20 more slits through the wall of the body characterised in the said at least one slit does not extend into that area of the wall of the body which forms the extremity of the outlet end, said inlet end having a bung inserted therein, said bung incorporating a valve.

25

In the preferred form of the invention the valve is, in its relaxed state, open to permit flow from the inlet end of the

body to the outlet end to occur. Preferably the bung and valve are moulded as a single unit from an elastomeric plastics material.

- 5 In the preferred form of the invention the valve includes a flap or flaps which are located within the hollow interior of the body and which close the valve immediately a pressure differential occurs between the hollow interior and that part of the bung which opens to the exterior of the teat body.

10

In the following more detailed description of the invention reference will be made to the accompanying drawings in which:-

- Figure 1 is a cross-sectional illustration of the teat disclosed in my New Zealand Patent Specification 247058,
15 Figure 2 is a perspective view of a bung for insertion into the inlet end of the teat,
Figure 3 is a cross-sectional illustration of a second form of the valved bung inserted in the end of the teat,
20 Figure 4 is a cross-sectional illustration of a valve arrangement for incorporation as an integral part of the bung, the valve being shown in the closed position,
Figure 5 is a view similar to Figure 3 but showing the valve in an opened position,
25 Figure 6 is a perspective view of a further embodiment of the bung and valve arrangement according to the invention,

Figure 7 is an end view of the valve of Figure 6,
Figure 8 is a cross-sectional view taken on line A-A of
Figure 6,

Figure 9 is a side elevation view of the bung and valve
5 arrangement of Figure 6,

Figure 10 is a further side elevation view of the bung
and valve arrangement of Figure 6,

Figure 11 is a cross-sectional view taken on line B-B of
Figure 6, and

10 Figure 12 is a perspective view of a tool part used in
the moulding of the valve and bung arrangement of
Figure 6.

The content of my New Zealand Patent Specification 247058 is
15 incorporated herein by way of specific reference.

As shown in Figure 1 the teat 10 has an inlet end 11 and an
outlet end 12. The inlet end 11 is provided with a radially
disposed flange 13 adjacent which is a groove 14. This
20 groove 14 is defined by flange 12 and an end wall surface of
an outwardly flared body portion 15.

A bung 16 is inserted in the inlet end 11, this bung having a
plurality of annular ribs 16a which engage in correspondingly
25 spaced and shaped grooves in flange 12. Other means of
retaining the bung in the inlet end can be employed as will
be appreciated by those skilled in the art. For example bung

16 could be held in place by a suitable adhesive or a bonding method suited to the plastic materials used for the bung and teat.

- 5 The outlet end has a nipple 17 with a forwardly facing curved end wall 18 and a side wall 19 which merges into the curved wall portion defining the outlet end 12. A plurality of slits 20 are provided for the outflow of feed, these slits extending alongside wall 19 from generally the point where it merges into the curved end wall portion of the outlet end 11. These slits do not extend across end wall 18 and preferably terminate at or just into the area of wall 18 where it merges into side wall 19.
- 10
- 15 As an alternative to the substantially longitudinally aligned slits 20 a spiral cut extending about side wall 19 could be provided.

In the form of the bung 16 illustrated in Figure 2 the bung is moulded from a suitable plastics material and the end 21 thereof which is innermost when bung 16 is inserted into the teat 10 is moulded closed. In a post-moulding operation, however, a peripheral cut 22 is formed in end 21 but does not extend completely about the end thus leaving an area of connecting material 23 which forms a hinge. The resultant flap 21a thus does not in the normal relaxed state sealingly close the bore through which liquid (milk product) can flow

20

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through the bung. This is because the hinge applies a biasing force which prevents flap 21a from sitting tight down on end 21 of the bung.

5 With the teat 10 full of feed (milk) an animal applies a squeezing action to the teat which not only causes milk to flow out through the slit(s) 20 but also to normally force back through the bung 16. Consequently the full charge of milk within the cavity 29 of teat 10 is not received by the
10 animal.

However, with the valve according to the present invention the squeezing action of the animal causes the milk to apply a back pressure which ensures that flap 21a sealingly seats on
15 the end 21 of the bung 16 thereby preventing back flow of milk through the bung 16. When the animal releases the teat 10 the pressure differential between the chamber 29 of the teat and the milk supply to the teat (via bung 16) causes milk to flow through the bung 16 thereby lifting flap 21a to
20 an open position (as shown in dotted detail in Figure 2). This ensures that a full charge of milk is received in chamber 29 via bung 16 prior to the animal next applying a squeezing action to the teat.

25 Other means of forming the valve integrally with the bung 16 can be provided. For example, in Figures 4 and 5 there is shown a valve arrangement which can be moulded within the

bung 16 and is comprised of a pair of overlapping flaps 24 and 25, these flaps taking up the overlapping position and thereby closing the valve when there is a back flow (ie the animal squeezes on the teat) and move apart to open the valve
5 when the animal has ceased squeezing and milk flows from the milk supply into the chamber 29 of the teat 10.

In the arrangement shown in Figure 3 there is shown a further arrangement where flaps 26 are moulded integrally with the
10 body of the teat 10 and cover a plurality of openings 28 formed in an otherwise closed end 27 of bung 16. Thus once again the flaps can move open (as illustrated on the left hand side of the drawing) to allow milk to flow into the chamber 29 and can close (as shown on the right hand side) in
15 the event of a back flow caused by the animal squeezing on the teat.

Further arrangements will be readily apparent to those skilled in the art. For example, the end 21 of bung 16 as
20 shown in Figure 2 could be of a configuration which narrows to a point which includes either a transverse or longitudinal slit or slits operable in a manner similar to a conventional teat or indeed according to the configuration of slits in the nipple 17 of the teat of the present invention.

25

A bung 16 of this particular type is, for example, illustrated in Figures 6-11 of the drawings. As with the

previous arrangements the bung 16 is generally cylindrical in shape and has a through bore or flow passage 30. A peripheral shoulder 31 is formed at the end of the bung which is situated at or protrudes from the inlet end of teat 10.

5 This shoulder engages against the end of the teat.

Adjacent the end of the bore 30 which is at the shoulder 31 end of the bung there is provided one or more circumferential ribs 32. At or adjacent the other end of the bore is a pair

10 of diametrically opposed radiused projections 33. Accordingly, the end of a tube can be inserted into the bore 30 and frictionally held therein by ribs 32. The radiused projections 33 form a stop for the end of the tube.

15 Projecting from the end of the bungs 16 which in use is innermost in the teat 10 is a valve projection 34 which is concentric with bore 30 and is formed by a pair of flaps 36 which are integrally formed with the bung 16. The flaps are conjoined as shown but defined at their outermost end an

20 elongate slot 38, this slot being transverse to the longitudinal axis of bore 30. In its moulded form the flaps 36 (as with the flaps of the other valve arrangements disclosed herein) do not close the bore 30.

25 In the preferred form of the invention the flaps are of extremely thin cross-sectional thickness and, in practise, will be thinner than illustrated being about 0.30mm or less.

As also illustrated, the slot is of a length substantially the same as the diameter of the bore 30. By way of example the slot can be about 11.40mm in length and about 1.00mm wide at its mid point.

5

To achieve a slot of this type the part of the moulding tool used to form the bore and the inner configuration of the flaps toward the slot is shown in Figure 12 wherein the distal end of the tool piece is in a blade form 37 and
10 preferably tapers to a sharp edge 39. This enables the moulded bung to have flaps which are of extremely thin wall thickness in the vicinity of at least the slot and that this slot is kept as narrow as possible.

15 The bung and valve arrangement of Figures 6-11 is extremely reactive to any pressure differential between the bore 30 (or a tube inserted therein) and the interior of the teat. Thus, when a young animal squeezes on the teat the liquid in the teat immediately tries to flow back through the valve but
20 this immediately causes the flaps to collapse or move toward one another to thereby close the slot 38. As a result no back flow through the bung can occur and a maximum charge of liquid through the slits 17 of the teat can occur.

25 However, upon the animal releasing pressure on the walls of the teat the slits 17 immediately close and seal the outlet end of the teat 10. This creates a further pressure

differential between the interior of the teat and bore 30 (or a tube inserted in bore 30) with the result that liquid in the bore (tube) immediately flows through the slot but due to the resilient nature of the flaps and their thin wall section the slot opens as wide as possible thereby ensuring ready flow of liquid into the body of the teat so as to fill same. Upon the animal applying another squeezing action to the teat the process is recommenced whereby the flaps close to seal the bung and thereby enable a maximum of charge of liquid to pass through the slits 17 into the animal's mouth.

The valve and bung arrangements according to the present invention all operate so that little pressure differential is required to cause the valves to open and equally little pressure is required to close the valve. As a consequence a maximum charge of the liquid in the teat is received by the animal yet upon the animal releasing pressure on the teat, the teat immediately recharges. Furthermore, as the valve is in its relaxed state open there is less chance of milk deposits blocking the valve. Also it is believed that the distortion of the flaps which occurs during open and closing results in there being little chance of deposits staying on the valve long enough to gum up the valve and prevent it from operating correctly.

CLAIMS

1. A teat comprising a hollow body (10) made of a resilient material, said body having an inlet end (11) and an outlet end (12), said outlet end including one or more slits (20) through the wall (19) of the body characterised in that said at least one slit does not extend into that area of the wall of the body which forms the extremity (18) of the outlet end, said inlet end having a bung (16) inserted therein, said bung incorporating a valve.
2. A teat as claimed in claim 1 wherein the valve is in its relaxed state open to permit flow from said inlet end (11) to said outlet end (12) to occur.
3. A teat as claimed in claim 1 or 2 wherein the bung (16) and valve are moulded as a single unit.
4. A teat as claimed in claim 3 wherein the bung (16) and valve are moulded from an elastomeric plastics material.
5. A teat as claimed in claim 2, 3 or 4 wherein the valve includes a flap or flaps (21a) located within the hollow interior of the body (10) and which close the valve immediately a pressure differential occurs between the

hollow interior and that part of the bung (16) which opens to the exterior of the teat body.

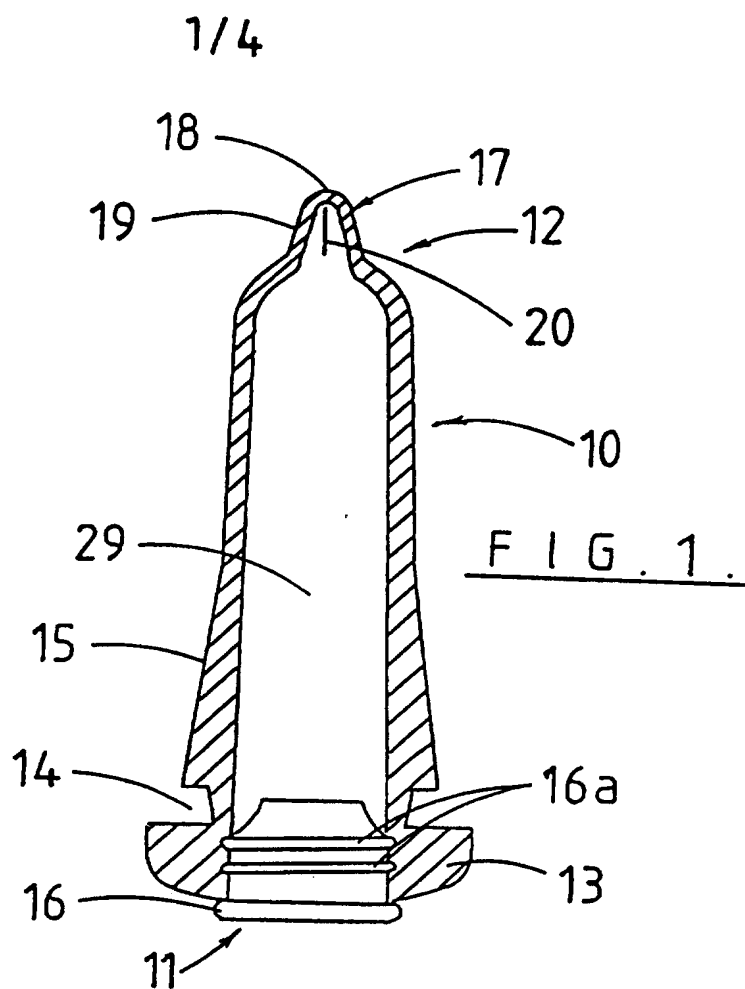
6. A teat as claimed in claim 5 wherein the bung (16) includes a pair of overlapping flaps (24 and 25).

7. A teat as claimed in claim 5 wherein the bung (16) includes a domed portion (27) having one or more openings (28), there being at least one flap (26) which is movable onto the dome to cover said openings.

8. A teat as claimed in any one of claims 4, 5 or 7 wherein the bung (16) includes a bore (30), one end of which is open to the exterior of the hollow body (10) and the other end of which is located within the hollow body, said flap(s) (36) being associated with said other end of the bore to prevent flow of liquid from within the hollow body to said one end.

9. A teat as claimed in claim 8 when appendant to claim 4 wherein a pair of flaps (36) project from said one end of the bore (30) and define therebetween an outlet slot (38) through which liquid passing through said one end of the bore can pass into the interior of the hollow body.

10. A teat as claimed in claim 9 wherein the flaps (36) are joined together except in the area in which they define the slot (38).
- 5 11. A teat as claimed in claim 9 wherein the flaps (36) in at least the area of the slot (38) are of extremely thin cross-sectional thickness.
- 10 12. A teat as claimed in claim 10 wherein the flaps (36) converge to said slot (31) from the said one end of the bore.
- 15 13. A teat as claimed in claim 11 wherein the length of the slot (28) is substantially the same as the diameter of the bore (30).
14. A teat as claimed in any one of the preceding claims wherein the bung (16) is adhered or bonded into the inlet end (11) of the hollow body (10).



(PRIOR ART)

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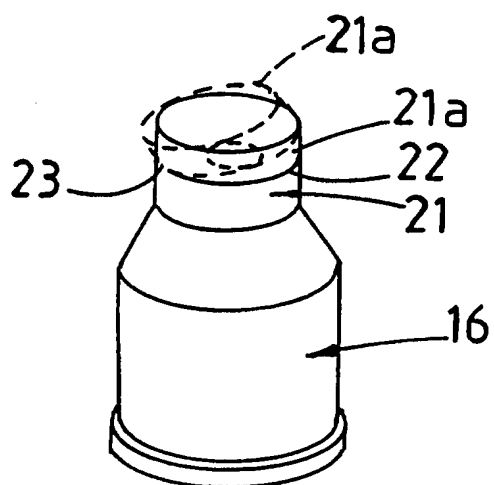


FIG. 2.

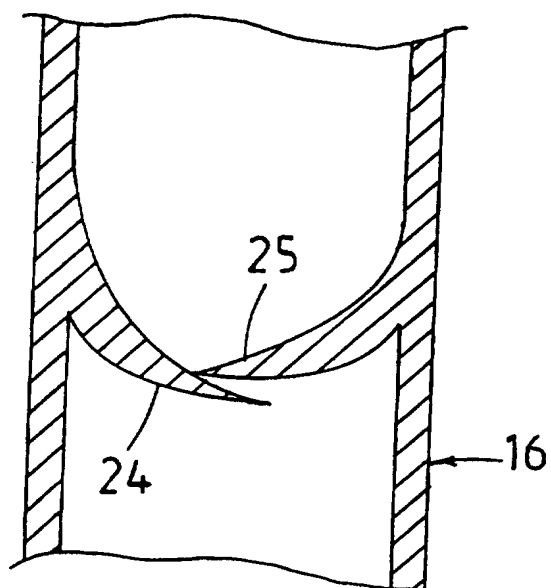


FIG. 4.

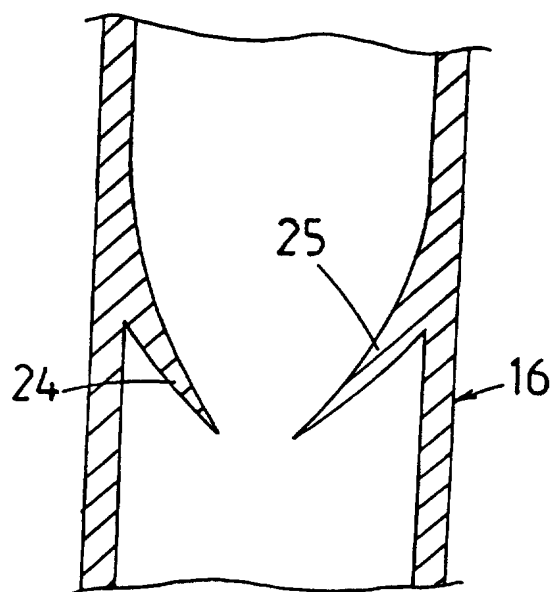
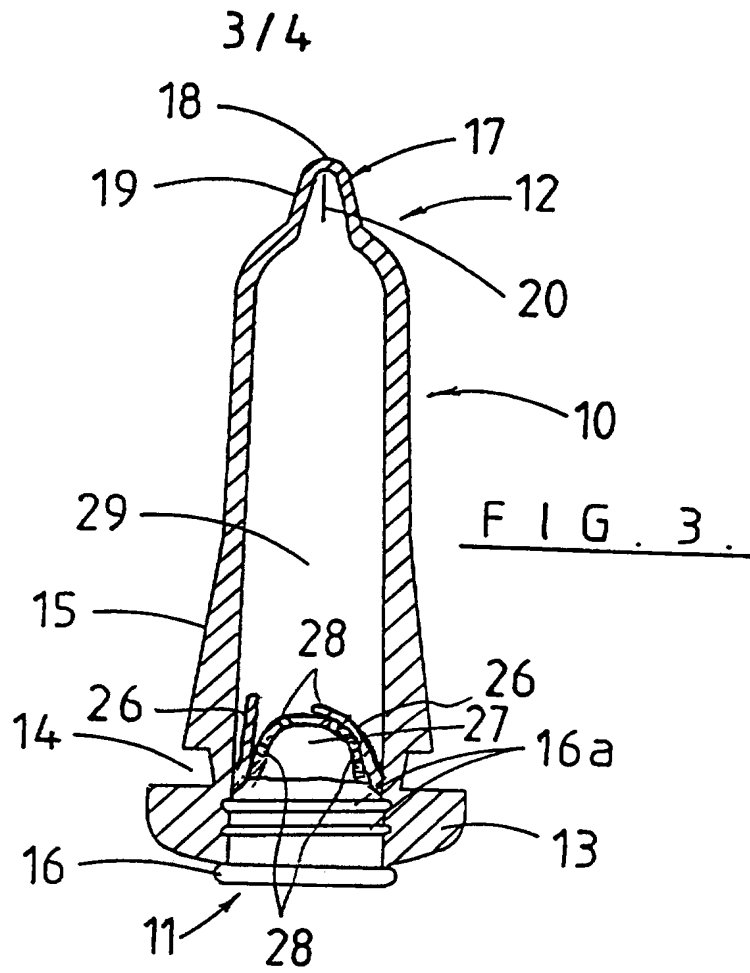


FIG. 5.



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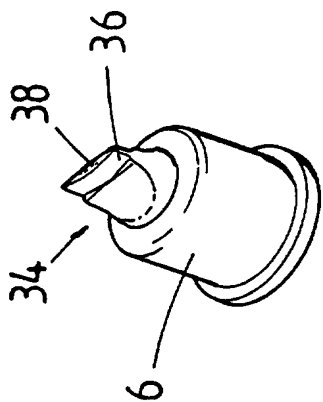


FIG. 6.

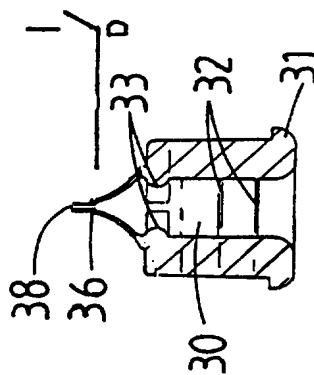


FIG. 8.

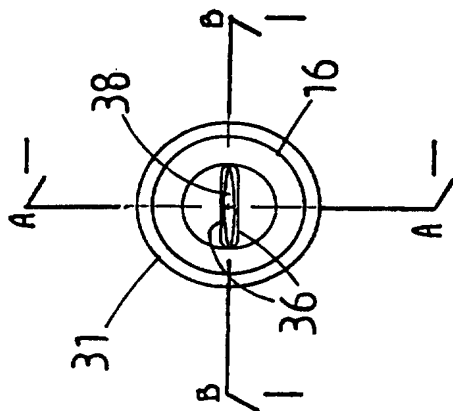


FIG. 7.

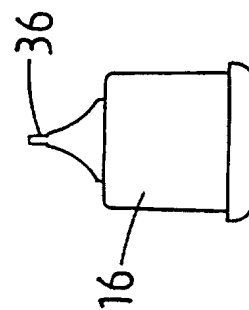


FIG. 9.

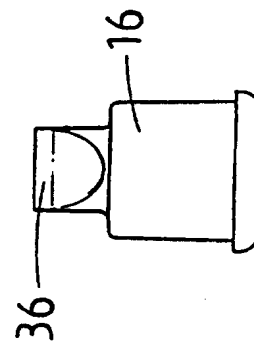


FIG. 10.

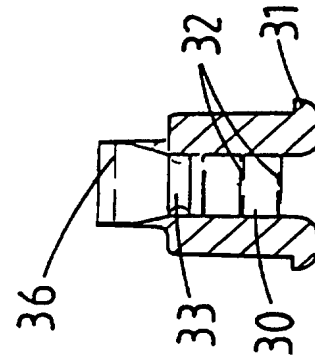


FIG. 11.

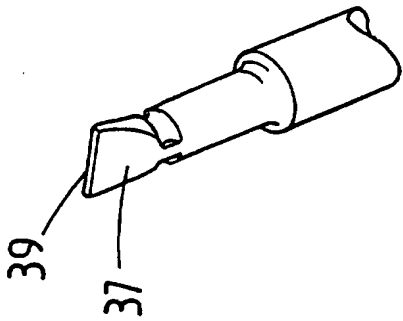


FIG. 12.

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/NZ 95/00098

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl⁶: A01K 9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int Cl⁶ A01K 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	AU 44642/93 A (McINTYRE et al) 29 September 1994 Page 2 line 21 - page 3 line 3, page 3 lines 17-19, figures 1, 3, 4	1 1-5, 14
Y	US 2628591 A (COYNER) 17 February 1953 Claims 1-3, figures 2-10	1-5, 14
Y	US 4633814 A (EASTMAN et al) 6 January 1987 Column 2 lines 57-65, figures 4, 5	1, 2, 5, 14



Further documents are listed in the continuation of Box C



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Date of the actual completion of the international search
22 December 1995

Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

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C (Continuation)

DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2607319 A (SHAPPEE) 19 August 1952 column 1 line 52 - column 2 line 6, figures 2, 3	1, 2, 5, 14
Y	US 2800107 A (NIGGELER) 23 July 1957 figures 3, 4	1
Y	US 2697414 A (COYNER) 21 December 1954 figure 2	1
Y	GB 936992 A (POOLE) 18 September 1963 figure 2	1
Y	GB 531916 A (ARMOUR & Co.) 14 January 1941 figure 2	1
A	WO 94/04023 A (McINNES) 3 March 1994	

INTERNATIONAL SEARCH REPORT

International Application No.
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Patent Document Cited in Search Report		Patent Family Member	
WO	9404023	EP	654964
END OF ANNEX			